META WATCH

REFLASH YOUR WATCH FIRMWARE

Document Version 2.0

Models: WDS11x

Styles: AU1000, AU2000, AU2001, AU2004

Revision 2.0	June 07, 2012
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1 Introduction

This document provides some basic instructions for how to reflash your MetaWatch without the need for an embedded programming IDE like TI Code Composer Studio or IAR Work Bench for MSP430.

1.1 REVISION HISTORY

Date	Change Description	Revision
6/7/2012	Added information for Linux and Mac OS	2.0

Table 1: Revision History

2 Why Reflash?

Meta Watch WDS111 and WDS112 are development systems, meaning that there is always some interesting development project. While reflashing your watch is not strictly required, you might want to:

- keep your watch up to date with the latest Meta Watch firmware. Bug fixes, enhancements, and extensions will constantly be in progress and contributed by the community. Take advantage of these releases and enjoy new features.

- find an interesting project that an embedded systems developer somewhere in the world has done. If the developer shares the binary file of the project, you can flash your watch with it and try it out for yourself.

Since you bought a development system, you can participate or follow the Meta Watch community. If you want to take the next step and work with the embedded system SDK for Meta Watch, you can create your own watch projects using an embedded programming IDE (Integrated Development Environment). Check the Developer section of MetaWatch.org for more details.

3   Setup

3.1   SYSTEM REQUIREMENTS

This method of reflashing requires

- A Meta Watch

- A personal computer with a USB port

- Windows XP, Vista or Windows 7 (or running one of these on a virtual machine)

- Mac OS X (minimum version TBD)

- Access to the Internet

3.2   MEET YOUR PROGRAMMING CLIP

Your Meta Watch development system comes with a programming clip (model AU0010) that attaches to the watch connecting the four waterproof pins on the back to a Texas Instruments Flash Emulation tool that we put inside the clip. The micro USB socket of the clip allows you to plug your watch into a USB hub or any 5V USB power source to recharge. When connected to a Personal Computer that supports the Flash Emulator USB drivers, you are able to reflash, debug, and program your watch.

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3.3   INSTALLING YOUR CLIP

3.3.1   Windows: Install the USB Drivers

- From the Developer section of the MetaWatch.org website, download the USB drivers (zip archive).

- Extract the files from the zip Archive

- The TI LaunchPad USB Driver.zip contains

    - LaunchPad_Driver.exe

    - 430cdc.cat

    - 430cdc.inf

- Run the LaunchPad_Driver.exe application, drivers will install automatically

- If you have any issues, check the Forum on MetaWatch.org.

3.3.2   Mac or Linux: Install the MSPDebug project

1. Download and install mspdebug by following the instructions here:

http://mspdebug.sourceforge.net/download.html

2. install a codeless kext by following the instructions here:

http://mspdebug.sourceforge.net/faq.html#rf2500_osx

3.4   CONNECT TO YOUR CLIP

Your programming clip has a spring that opens when you squeeze like a clothespin. The bottom of the clip has the four gold plated contact pins, the top of the clip You can then clip it onto the head of the watch, the top side of the clip to rest on the watch glass. The bottom side of the clip has a raised area around the contact pins that keys into a matching recessed area on the case back of the watch.

Make sure the bottom of the clip is tight and flat, which occurs when the raised area is keyed properly into the recessed area.

Connect the clip to the watch, plug in the USB cable (a micro USB cable is supplied in the box for you) and plug the other end into a USB power supply. The watch is designed to recharge from this micro USB port and operate from this power supply while charging.

Plug the watch in and let it charge to a full battery (around 4 hours from a completely depleted battery).

3.5 ABOUT WATCH FIRMWARE

The watch firmware is a program that was compiled for the MSP430 microprocessor in the watch and saved as a file. Typically this file contains data in a binary format, but it could also be encoded in ASCII format. Common extensions for these files are .d43, .txt, .out, or .hex.

This example will use a file named DigitalWatchV0_10_6.d43, which is the first version of the Meta Watch digital watch firmware released and we think back on those days wistfully.

3.6 WINDOWS: DOWNLOAD AND CONFIGURE AN MSP430 FLASH UTILITY

Check the Developer section of MetaWatch.org for more choices, but for this example we will use a free application called FET-PRO430 from a company called Elprotronic (www.elprotronic.com).
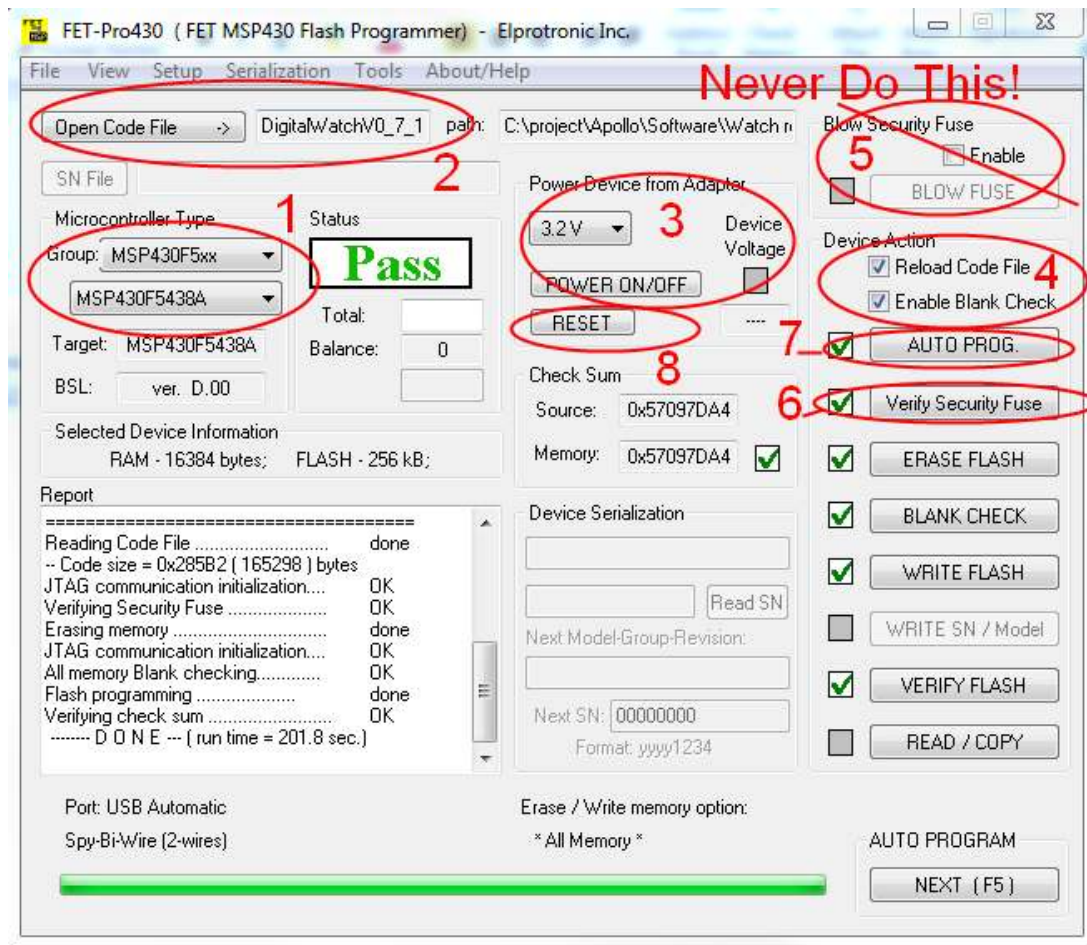
This URL takes you straight to the application to download:

http://www.elprotronic.com/files/FET-Pro430-Lite-Setup.zip

3.6.1 Configure the MSP450 Flash Utility

3.6.1.1   Main Screen

1. Choose MSP430F5xx from the top drop-down list and MSP4305438A from the bottom drop-down list.

2. This is where you browse to and select the binary file for your watch.

3. Make sure that Power Device from Adapter is turned OFF

4. Check "Reload Code File" and "Enable Blank Check"

5. Never, never, never check "Enable" here. If you do, you might accidently blow the security Fuse. If you Blow the security fuse then you can NEVER REFLASH AGAIN. Best to leave this alone, it's no fun.

6. The Verify Security Fuse button is a good check to see if your watch is talking.

7. "Auto Prog" is what you will use to start the reflash process when all is setup. **Don't use it yet!**

8. "Reset" can be used anytime after you use "Verify Security Fuse". This will reset your watch. Useful if you tried out some software that locked-up on you. Should be used after ever reflash process or your watch will not run the new program.

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3.6.1.2   Connection and Reset Options Screen
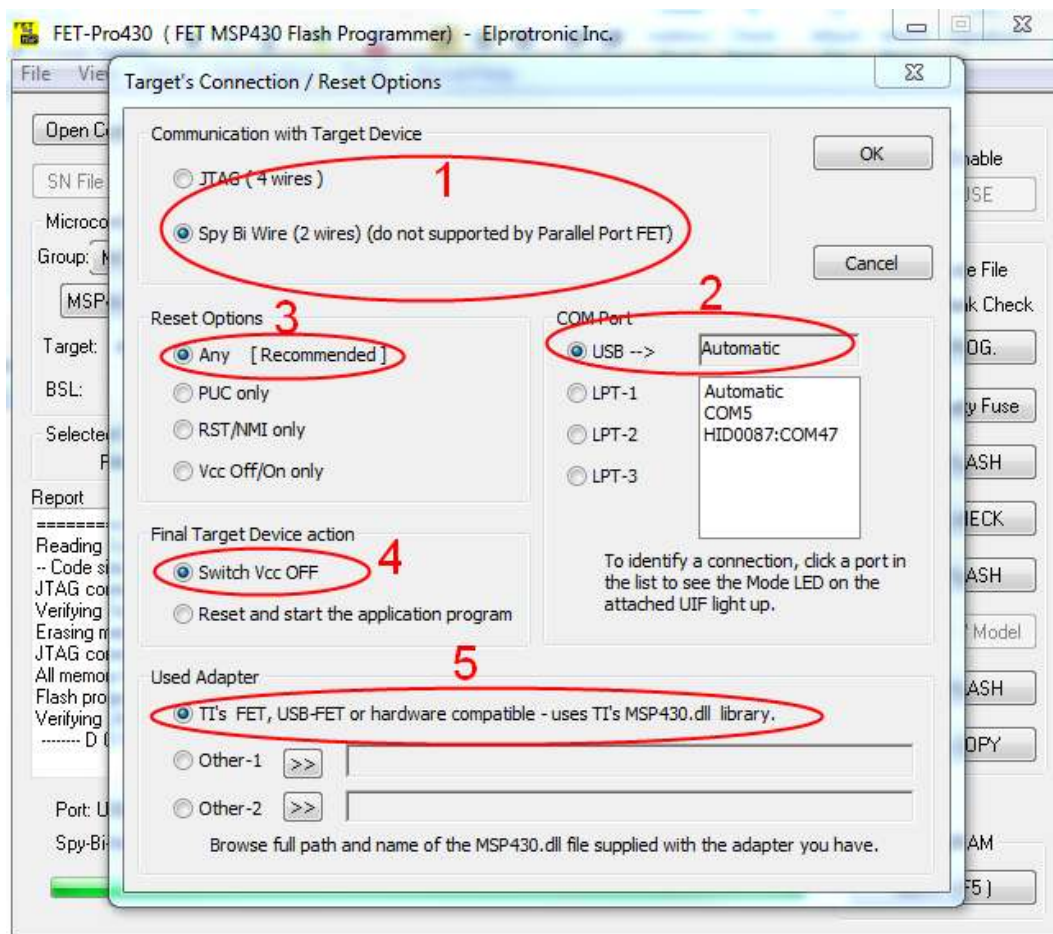
1. The watches use Spy-Bi-Wire (2-wire JTAG). The 4 wire version should still work as well. We're sure which one is faster or less error prone yet.

2. Make sure you choose "USB". You can put this on "Automatic" if you like. You should see the programming clip in the list of USB devices in the white box. If not, try unplugging and plugging in again.

3. "Any" is best here.

4. Your choice. Depends on whether you want control over when the watch resets after a flash operation.

5. "TI's FET, USB-FET or hardware compatible…." should be used. Yup, that's us.

4 Reflash Time

4.1 WINDOWS

Once everything is setup, press "Verify Security Fuse", if everything is setup and the PC is communicating with the clip and the clip is communicating with the MSP430 in the watch, then this will Pass.

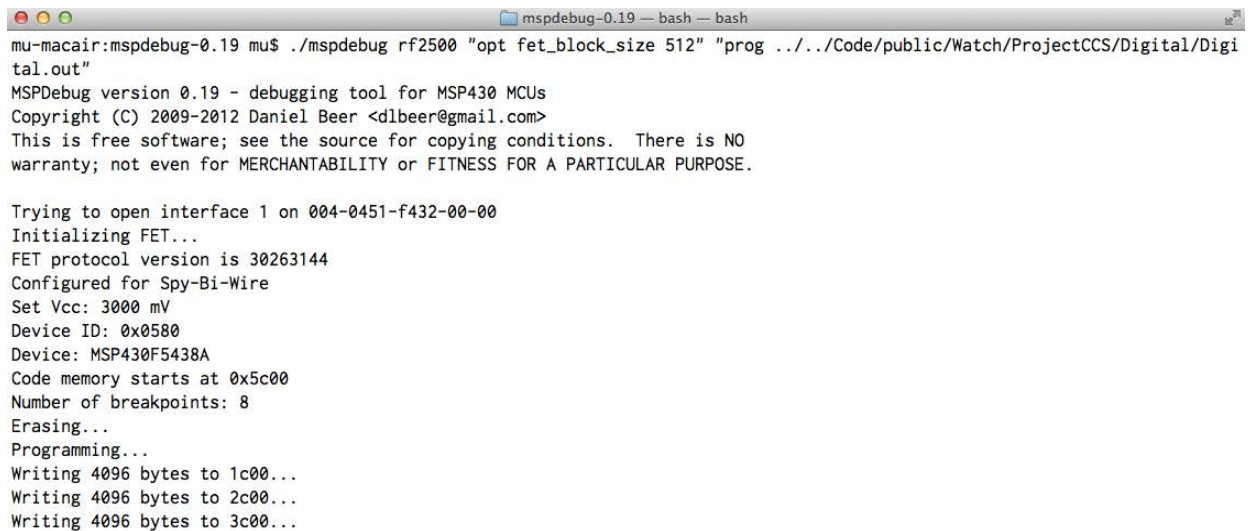Next Press "Auto Prog", each step will show as Pass or Fail.

When the process done, press "Reset" and your watch should boot using the new firmware. Then you can remove the watch from the clip.

You can also use the clip and tool with "Auto prog" followed by "Reset" to recover from a lockup when you're testing.

4.2 MAC OR LINUX

issue command:
 ./mspdebug rf2500 "opt fet_block_size 512" "prog *.hex or .out file name*"

```
mu-macair:mspdebug-0.19 mu$ ./mspdebug rf2500 "opt fet_block_size 512" "prog ../../Code/public/Watch/ProjectCCS/Digital/Digital.out"
MSPDebug version 0.19 - debugging tool for MSP430 MCUs
Copyright (C) 2009-2012 Daniel Beer <dlbeer@gmail.com>
This is free software; see the source for copying conditions.  There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

Trying to open interface 1 on 004-0451-f432-00-00
Initializing FET...
FET protocol version is 30263144
Configured for Spy-Bi-Wire
Set Vcc: 3000 mV
Device ID: 0x0580
Device: MSP430F5438A
Code memory starts at 0x5c00
Number of breakpoints: 8
Erasing...
Programming...
Writing 4096 bytes to 1c00...
Writing 4096 bytes to 2c00...
Writing 4096 bytes to 3c00...
```

5 Troubleshooting

If your clip is not showing up in the list of USB devices.

- Try unplugging the clip and pluging it back in.

- Try a different USB port, see if you get a different result.

- Try a different USB cable.

- Try rebooting.

If the green light does not turn on, then the 5V power source from the USB hub is not working.

- Try unplugging the clip and pluging it back in.

- Try a different USB port, see if you get a different result.

- Try a different USB cable.

- Try a different USB hub.

- Try a 5V AC adapter source of power to test the clip.

If the "Verify Security Fuse" action fails, but the clip is in the list of USB devices

- Try taking the watch off the clip and putting it back on.

- Make sure the bottom of the clip is flat with the back of the watch

- Try a different USB port, see if you get a different result.

- Try a different USB cable.

- Try resetting the watch.

- Try closing and re-opening the MSP430 Flash utility.

- Try switching to 2-wire or 4-wire JTAG in the Target Connection menu.

6 Participate in the Community

You make us better. Help improve Meta Watch by reporting bugs, contributing your own code, requesting enhancements, or just participating in the discussion. Please visit the Forums section of www.MetaWatch.org and join the community!